Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code: 3160620 Date:26-05-2025

Subject Name: Instrumentation and Sensors

Time: 10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define: i) Transducer ii) Sensor.	**03**
	(b)	List the use of following given sensor 1.Piezometer 2.Inclinometer	**04**
	(c)	List various Flow sensor and explain any one of them	**07**
Q.2	**(a)**	What is strain gauge? & explain load cell.	**03**
	(b)	Explain the principle and working of a strain gauge .Derive the expression of gauge factor.	**04**
	(c)	Draw and explain the block diagram of the instrumentation system.	**07**
		OR	
	(c)	Discuss in detail various types of errors associated in measurement and how these errors can be minimized?	**07**
Q.3	**(a)**	Define target for Approach to Planning Monitoring Programs.	**03**
	(b)	Explain in brief sensor installations.	**04**
	(c)	Explain the types of proximity sensors and describe their use as accelerometer and vibration sensor	**07**
		OR	
Q.3	**(a)**	Explain Measurement uncertainty.	**03**
	(b)	Differentiate between continuous and discrete signals.	**04**
	(c)	Write a short note on to predict the response ofvarious inputs.	**07**
Q.4	**(a)**	What is aliasing? How can it remove?	**03**
	(b)	List Criteria for Sensor Sitting.	**04**
	(c)	Explain one case study of Approach to Planning and Monitoring Programs	**07**
		OR	
Q.4	**(a)**	Define Signal and Noise.	**03**
	(b)	Define (i) Variance (ii) Deviation (iii) Median (iv) Mode.	**04**
	(c)	Explain types of filters used in frequency domain analysis	**07**
Q.5	**(a)**	Define following term 1.Averagevalue (mean) 2. Standarddeviation	**03**
	(b)	Differentiate between types of sensors and their modes of operation and measurement.	**04**
	(c)	Explain the need for frequency domain analysis and its principles.	**07**
		OR	
Q.5	**(a)**	Describe Noise reduction with filters.	**03**
	(b)	Write a short note on the time domain signal processing.	**04**
	(c)	What is FFT and explain its application in civil engineering.	**07**

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Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code:3160620 Date:20-05-2024

Subject Name:Instrumentation and Sensors

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	(a)	Give the definition of a) Measurement b) Instrumentation.	**03**
	(b)	List out various physical variables.	**04**
	(c)	What do you mean by sensor? Explain different types of sensors in detail.	**07**
Q.2	(a)	What are the different types of signal and differentiate it.	**03**
	(b)	Explain the types of Systematic errors in measurement.	**04**
	(c)	Draw and Explain the block diagram of instrumentation system.	**07**
		OR	
	(c)	Explain the basic concepts in frequency domain signal processing and analysis.	**07**
Q.3	(a)	Explain the flow of planning of monitoring programs.	**03**
	(b)	List out and explain the Criteria for Sensor Selection.	**04**
	(c)	List out various temperature sensors and explain any one of them.	**07**
		OR	
Q.3	(a)	Why Piezometer is used ? Give the types of Piezometers.	**03**
	(b)	What is a noise? & explain the different types of noise.	**04**
	(c)	Explain the different Data Reduction Techniques in detail.	**07**
Q.4	(a)	Explain the Frequency resolution.	**03**
	(b)	Explain in brief sensor installations.	**04**
	(c)	Draw the functional block diagram of measurement system. Mentions the purpose of measurement. What are the methods of measurement?	**07**
		OR	
Q.4	(a)	List any two light sensors.	**03**
	(b)	Write a short note on the time domain signal processing.	**04**
	(c)	Explain types of filters used in frequency domain analysis	**07**
Q.5	(a)	Define following term 1. Median 2. Range	**03**
	(b)	Write a short note on the data analysis and interpretation with reference to inclinometer.	**04**
	(c)	Explain the Classification of Transducer in detail.	**07**
		OR	
Q.5	(a)	What is the Working principle of Load Cell.	**03**
	(b)	Write a short note on the Fast Fourier Transform (FFT).	**04**
	(c)	Explain the need for frequency domain analysis and its principles.	**07**

Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2023

Subject Code:3160620 Date:10-07-2023

Subject Name:Instrumentation and Sensors

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	What is measurement & instrumentation? & Explain the elements of measurement systems.	**03**
	(b)	List the use of following given sensor, 1. Piezometer 2. Inclinometer	**04**
	(c)	What is strain gauge? & explain load cell.	**07**
Q.2	**(a)**	List various physical variable.	**03**
	(b)	What is sensor? List out various type of sensor with their use.	**04**
	(c)	List various Flow sensor and explain any one of them.	**07**
		OR	
	(c)	List various pressure sensor and explain any one of them.	**07**
Q.3	**(a)**	Explain Measurement uncertainty.	**03**
	(b)	Explain types of instrumentation.	**04**
	(c)	List various temperature sensor and explain any one of them.	**07**
		OR	
Q.3	**(a)**	What are the different types of signal and differentiate it.	**03**
	(b)	What is noise? & explain SNR.	**04**
	(c)	Explain the types of proximity sensors and describe their use as accelerometer and vibration sensor	**07**
Q.4	**(a)**	Define target for Approach to Planning Monitoring Programs	**03**
	(b)	List Criteria for Sensor siting.	**04**
	(c)	Explain Permanent installations & Temporary installations of sensor.	**07**
		OR	
Q.4	**(a)**	Describe the order and methodology for sensor installation	**03**
	(b)	List Criteria for Sensor selection.	**04**
	(c)	Explain one case study of Approach to Planning and Monitoring Programs	**07**
Q.5	**(a)**	Define following term 1. Mode 2. Range	**03**
	(b)	Explain Time domain signal processing.	**04**
	(c)	What is FFT and explain its application in civil engineering.	**07**
		OR	
Q.5	**(a)**	Define following term 1. Average value (mean) 2. Standard deviation	**03**
	(b)	Explain Fourier Transform & its application.	**04**
	(c)	Explain the need for frequency domain analysis and its principles.	**07**

Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160620 Date:06/06/2022

Subject Name:Instrumentation and Sensors

Time:10:30 AM TO 01:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define: Measurement and Instrumentation.	**03**
	(b)	What is sensor? Explain the different criteria to choose sensor.	**04**
	(c)	Compare with necessary examples: Permanent installation and Temporary installation.	**07**
Q.2	**(a)**	Differentiate between the Absolute and Secondary instruments.	**03**
	(b)	Explain sensor classification based on the physical properties.	**04**
	(c)	Draw and explain the block diagram of instrumentation system.	**07**
		OR	
	(c)	Explain with suitable example: Average value (mean), Standard deviation, Median, Mode, Range.	**07**
Q.3	**(a)**	Explain the flow of planning of monitoring programs.	**03**
	(b)	Explain in brief: Sensor selection criteria.	**04**
	(c)	Write a short note on to predict the response of various inputs.	**07**
		OR	
Q.3	**(a)**	Define: Sensor siting.	**03**
	(b)	Differentiate between continuous and discrete signals.	**04**
	(c)	Write a short note on Construct a conceptual instrumentation and monitoring program.	**07**
Q.4	**(a)**	Define: Frequency resolution.	**03**
	(b)	Differentiate between types of sensors and their modes of operation and measurement.	**04**
	(c)	Describe the order and methodology for sensor installation by considering example of Real Time Hydrological Information System.	**07**
		OR	
Q.4	**(a)**	Define: Signal and Noise.	**03**
	(b)	Write a short note on the time domain signal processing.	**04**
	(c)	Explain in brief about data reduction and interpretation with necessary example.	**07**
Q.5	**(a)**	Define: Measurement uncertainty.	**03**
	(b)	Write a short note on the data analysis and interpretation with reference to inclinometer.	**04**
	(c)	Explain the need for the frequency domain analysis and its principles.	**07**
		OR	
Q.5	**(a)**	Describe Noise reduction with filters.	**03**
	(b)	Write a short note on the Fast Fourier Transform (FFT).	**04**
	(c)	Explain the basic concepts in frequency domain signal processing and analysis.	**07**

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